

Integrating the Healthcare Enterprise



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IHE IT Infrastructure (ITI) Technical Framework Supplement

10

Sharing Valuesets, Codes, and Maps (SVCMM)

HL7[®] FHIR[®] Release 4

Using Resources at FMM Level 3 - Normative

15

Revision 1.2 – Trial Implementation

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Please verify you have the most recent version of this document. See [here](#) for Trial Implementation and Final Text versions and [here](#) for Public Comment versions.

Foreword

This is a supplement to the IHE IT Infrastructure Technical Framework V16.0. Each supplement undergoes a process of public comment and trial implementation before being incorporated into the volumes of the Technical Frameworks.

This supplement is published on June 4, 2020 for trial implementation and may be available for testing at subsequent IHE Connectathons. The supplement may be amended based on the results of testing. Following successful testing it will be incorporated into the IT Infrastructure Technical Framework. Comments are invited and may be submitted at http://www.ihe.net/ITI_Public_Comments..

This supplement describes changes to the existing technical framework documents.

“Boxed” instructions like the sample below indicate to the Volume Editor how to integrate the relevant section(s) into the relevant Technical Framework volume.

Amend Section X.X by the following:

Where the amendment adds text, make the added text **bold underline**. Where the amendment removes text, make the removed text **~~bold strikethrough~~**. When entire new sections are added, introduce with editor’s instructions to “add new text” or similar, which for readability are not bolded or underlined.

General information about IHE can be found at <http://ihe.net>.

Information about the IHE IT Infrastructure domain can be found at http://ihe.net/IHE_Domains.

Information about the organization of IHE Technical Frameworks and Supplements and the process used to create them can be found at http://ihe.net/IHE_Process and <http://ihe.net/Profiles>.

The current version of the IHE IT Infrastructure Technical Framework can be found at http://ihe.net/Technical_Frameworks.

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Introduction to this Supplement

Whenever possible, IHE profiles are based on established and stable underlying standards. However, if an IHE committee determines that an emerging standard offers significant benefits for the use cases it is attempting to address and has a high likelihood of industry adoption, it may develop IHE profiles and related specifications based on such a standard.

The IHE committee will take care to update and republish the IHE profile in question as the underlying standard evolves. Updates to the profile or its underlying standards may necessitate changes to product implementations and site deployments in order for them to remain interoperable and conformant with the profile in question.

This ITI Technical Framework Supplement uses the emerging HL7® FHIR® specification. The FHIR release profiled in this supplement is Release 4. HL7 describes the STU (Standard for Trial Use) standardization state at <https://www.hl7.org/fhir/versions.html>.

In addition, HL7 provides a rating of the maturity of FHIR content based on the FHIR Maturity Model (FMM): level 0 (draft) through 5 (normative ballot ready). The FHIR Maturity Model is described at <http://hl7.org/fhir/versions.html#maturity>.

Key FHIR Release 4 content, such as Resources or ValueSets, used in this profile, and their FMM levels are:

FHIR Content (Resources, ValueSets, etc.)	FMM Level
ValueSet	Normative
CodeSystem	Normative
ConceptMap	3
Parameters	Normative

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The Sharing Valuesets, Codes, and Maps (SVCM) Profile defines a lightweight interface through which healthcare systems may retrieve centrally managed uniform nomenclature and mappings between code systems based on the HL7 Fast Healthcare Interoperability Resources (FHIR) specification.

240

The SVCM Profile leverages the IHE ITI Sharing Value Sets (SVS) and IHE Patient Care Coordination Concept Mapping (CMAP) Profiles¹, combining the functionalities of each and simplifying for a lighter weight, mobile-compatible transport and messaging format. This profile

¹ http://ihe.net/Technical_Frameworks/

245 leverages HTTP transport, JavaScript Object Notation (JSON), Simple-XML, and Representational State Transfer (REST). The payload format is defined by the HL7 FHIR standard.

This supplement is intended to be fully compliant with the HL7 FHIR specification, providing only use-case driven constraints to aid with interoperability.

250 The HL7 FHIR CodeSystem and ValueSet Resources used in this profile are at Normative maturity level. The FHIR ConceptMap Resource is not yet normative but is not expected to be revised in a manner that would substantively impact this profile.

The SVCMM Profile provides an alternative for the exchange and management of the metadata required for sharing data and provides an alternative to the use of HL7 Common Terminology Services (CTS) and Common Terminology Services 2 (CTS 2) with HL7 FHIR.

255 SVCMM will create an easily referenceable source for profiles to use the Terminology Repository in their workflows.

A single Terminology Repository can be accessed by many Terminology Consumers, establishing a domain of consistent and uniform set of nomenclatures. It supports automated loading of value sets by Terminology Consumers, reducing the burden of manual configuration.

260 **Open Issues and Questions**

None

Closed Issues

265 SVCMM1 - For the validate and translate concept map, is an additional actor needed? (that can be drawn from existing actors in other profiles) Simplified actors to “Terminology Repository” and “Terminology Consumer.”

SVCMM2 - Use of the Clinical Mapping Profile (CMAP). Decision made to merge the updated FHIR-enabled SVS and CMAP Profiles into one here.

SVCMM3 - Within the document, two words are being used for “value set.” One word “valuesets” is being used in the title to simplify and avoid the use of commas in the title.

270 SVCMM4 - Older SVS language on the “Retrieve multiple value sets” transaction on intensional and extensional value set definitions was removed.

SVCMM5 - Combine discovery use case for Code System, Value Set and Concept Map into one or separate out Concept Map discovery as its own use case?

Decided to keep these as one as the workflow is the same.

275 SVCMM6 - Confirm title for the merged SVS and updated CMAP Profiles – SVCMM?

Title confirmed

SVCM7 - Need decision on how/whether to incorporate Clinical Mapping (CMAP) Actor Options

Decided to not incorporate those options

280 SVCM8 - Are there concepts or descriptions included in X.4 that are unnecessary for the purposes of this profile?

Removed most of this section to streamline it.

285

IHE Technical Frameworks General Introduction

The [IHE Technical Framework General Introduction](#) is shared by all of the IHE domain technical frameworks. Each technical framework volume contains links to this document where appropriate.

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9.1.3 LOINC (Logical Observation Identifiers Names and Codes)

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320 **9.1.4 SNOMED CT (Systematized Nomenclature of Medicine -- Clinical Terms)**

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General Introduction and Shared Appendices

The [IHE Technical Framework General Introduction Appendices](#) are components shared by all of the IHE domain technical frameworks. Each technical framework volume contains links to these documents where appropriate.

335

*Update the following appendices to the General Introduction as indicated below. Note that these are **not** appendices to this domain's Technical Framework (TF-1, TF-2, TF-3 or TF-4) but rather, they are appendices to the IHE Technical Frameworks General Introduction located [here](#).*

340 Appendix A – Actor Summary Definitions

*Add the following **new or modified** actors to the IHE Technical Frameworks General Introduction Appendix A:*

Actor Name	Definition
Terminology Consumer	Uses codes, Value Sets, and Concept Maps.
Terminology Repository	Provides codes, Value Sets, and Concept Maps.

Appendix B – Transaction Summary Definitions

345 *Add the following **new or modified** transactions to the IHE Technical Frameworks General Introduction Appendix B:*

Transaction Name and Number	Definition
Query Value Set [ITI-95]	Search for multiple Value Sets or retrieve a single Value Set.
Query Code System [ITI-96]	Search for Code Systems or retrieve a single Code System.
Expand Value Set [ITI-97]	Expand the given Value Set to retrieve the list of available concepts.
Lookup Code [ITI-98]	Retrieve the details for a code from a Code System.
Validate Code [ITI-99]	Validate the existence of a code in a Code System or Value Set.
Query Concept Map [ITI-100]	Search for multiple Concept Maps or retrieve a single Concept Map.
Translate Code [ITI-101]	Return the translation of a code from a source Value Set into a target Value Set.

Appendix D – Glossary

350 *Add the following **new or updated** glossary terms to the IHE Technical Frameworks General Introduction Appendix D.*

No new terms.

Volume 1 – Profiles

51 Sharing Valuesets, Codes, and Maps (SVCN)

355 The Sharing Valuesets, Codes, and Maps (SVCN) Profile defines a lightweight interface through which healthcare systems may retrieve centrally managed uniform nomenclature and mappings between code systems, using the HL7 Fast Healthcare Interoperability Resources (FHIR) specification.

Terminologies managed in value sets are most useful when they are widely shared and standardized across geography and disciplines to add clarity and specificity.

360 51.1 SVCN Actors/Transactions

This section defines the actors and transactions in this profile. General definitions of actors are given in the Technical Frameworks General Introduction Appendix A at http://ihe.net/Technical_Frameworks.

365 Figure 51.1-1 shows the actors directly involved in the SVCN Profile and the relevant transactions between them. Other actors that may be indirectly involved due to their participation in related profiles are not necessarily shown.

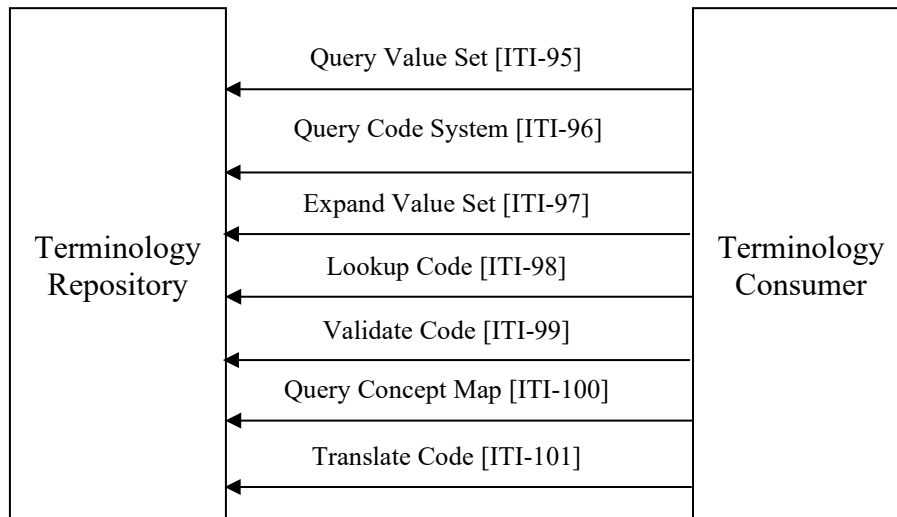


Figure 51.1-1: Actors and Transactions

370 Table 51.1-1 SVCN Integration Profile - Actors and Transactions lists the transactions for each actor directly involved in the SVCN Profile. In order to claim support of this Integration Profile, an implementation must perform the required transactions (labeled “R”). Transactions labeled

“O” are optional. A complete list of options defined by this Integration Profile is shown in Table 51.2-1.

Table 51.1-1: SVCM Integration Profile - Actors and Transactions

Actors	Transactions	Initiator or Responder	Optionality	Section
Terminology Consumer	Query Value Set [ITI-95]	Initiator	O (Note 1)	ITI TF-2c: 3.95
	Query Code System [ITI-96]	Initiator	O (Note 1)	ITI TF-2c: 3.96
	Expand Value Set [ITI-97]	Initiator	O (Note 1)	ITI TF-2c: 3.97
	Lookup Code [ITI-98]	Initiator	O (Note 1)	ITI TF-2c: 3.98
	Validate Code [ITI-99]	Initiator	O (Note 1)	ITI TF-2c: 3.99
	Query Concept Map [ITI-100]	Initiator	O	ITI TF-2c: 3.100
	Translate Code [ITI-101]	Initiator	O	ITI TF-2c: 3.101
Terminology Repository	Query Value Set [ITI-95]	Responder	R	ITI TF-2c: 3.95
	Query Code system [ITI-96]	Responder	R	ITI TF-2c: 3.96
	Expand Value Set [ITI-97]	Responder	R	ITI TF-2c: 3.97
	Lookup Code [ITI-98]	Responder	R	ITI TF-2c: 3.98
	Validate Code [ITI-99]	Responder	R	ITI TF-2c: 3.99
	Query Concept Map [ITI-100]	Responder	O	ITI TF-2c: 3.100
	Translate Code [ITI-101]	Responder	O	ITI TF-2c: 3.101

375 Note 1: A Terminology Consumer shall support at least one of these transactions.

51.1.1 Actor Descriptions and Actor Profile Requirements

Most requirements are documented in ITI TF-2 Transactions. This section documents any additional requirements on profile’s actors.

380 In addition to an IHE Integration Statement, the Terminology Consumer and Terminology Responder shall provide a CapabilityStatement Resource as described in ITI TF-2x: Appendix Z.4 indicating the capabilities defined for all the transactions implemented including all query parameters implemented.

51.2 SVCM Actor Options

385 Options that may be selected for this Integration Profile are listed in Table 51.2-1 Sharing Value Sets - Actors and Option, along with the actors to which they apply. Dependencies between options, when applicable, are specified in notes.

Table 51.2-1: Sharing Value Sets - Actors and Options

Actor	Options	Vol. & Section
Terminology Consumer	Translate Option	Section 51.2.1
Terminology Repository	Translate Option	Section 51.2.1

51.2.1 Translate Option

The translate option enables querying for Concept Maps and translating codes.

A Terminology Consumer or Terminology Repository that supports the Translate Option shall support the Query Concept Map [ITI-100] and Translate Code [ITI-101] transactions. See ITI TF-2c: 3.100 and ITI TF-2c: 3.101.

51.3 SVCN Required Actor Groupings

An actor from this profile (Column 1) shall implement all of the required transactions and/or content modules in this profile *in addition to all* of the requirements for the grouped actor (Column 2).

Table 51.3-1: SVCN Profile - Required Actor Groupings

SVCN Actor	Actor(s) to be grouped with	Reference	Content Bindings Reference
Terminology Consumer	None	--	--
Terminology Repository	ATNA / Secure Node or Secure Application	ITI TF-1: 9	--

51.4 SVCN Overview

51.4.1 Concepts

The FHIR terminology specification defines the following terms, see

<http://hl7.org/fhir/R4/terminology-module.html>:

- **Concept** – A code and definition. A representation of a real or abstract thing, which provides meaning.
- **Code System** - Define concepts and give them meaning through formal definitions, and assign codes that represent the concepts. Examples of code systems include ICD-10, LOINC, SNOMED-CT, and RxNorm. See <https://www.hl7.org/fhir/terminologies.html#valuesets>.

- **Value Set** - Specifies a set of codes defined by code systems that can be used in a specific context. Value sets link code system definitions and their use in coded elements. See <https://www.hl7.org/fhir/terminologies.html#valuesets>.
- 415 • **Concept Map** - Defines a mapping from a set of concepts defined in a code system to one or more concepts defined in other code systems. See <http://hl7.org/fhir/R4/conceptmap.html> and http://www.hl7.org/documentcenter/public/standards/V3/core_principles/infrastructure/coreprinciples/v3modelcoreprinciples.html#gl-concept.
- 420 • **Value Set Expansion** - Converts a Value Set to a list of concept representations at a point in time, which typically consists of codes. Good practice is that a system that captures a coded value should be capable of reconstructing the Value Set Expansion in effect when a given code was selected.
- 425 http://www.hl7.org/documentcenter/public/standards/V3/core_principles/infrastructure/coreprinciples/v3modelcoreprinciples.html#coreP_Coded_Properties-value-sets-resolution.

51.4.2 Use Cases

The following use cases provide examples of how this profile might be used by various disciplines.

51.4.2.1 Use Case #1 - Code System, Value Set, and Concept Map Discovery

- 430 In this use case, a Terminology Consumer retrieves and filters a list of Code Systems, Value Sets, or Concept Maps available in a Terminology Repository.

51.4.2.1.1 Code System or Value Set Discovery Use Case Description

- 435 A Terminology Consumer requires a method for querying a Terminology Repository for a list of available Value Sets, Code Systems, and Concept Maps, based on filter criteria. Periodically, a health care organization publishes updated Value Sets, Code Systems, and Concept Maps documenting the codes that point of service systems must use. An electronic medical record system, the Terminology Consumer, periodically retrieves the list of available Value Sets, Code Systems, and Concept Maps that are relevant to its care unit and verifies that it has an up-to-date version of each cached locally.

440

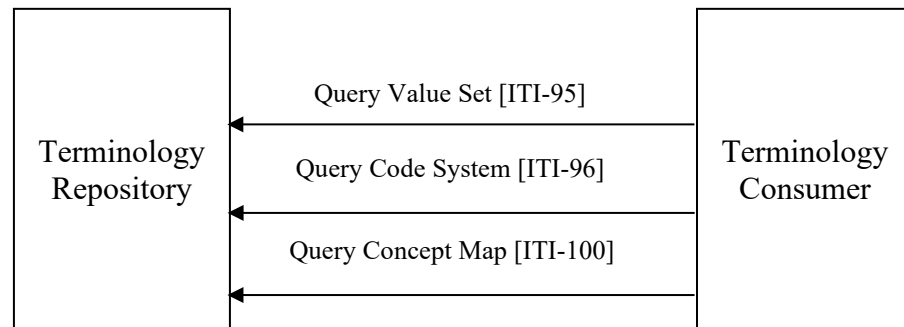


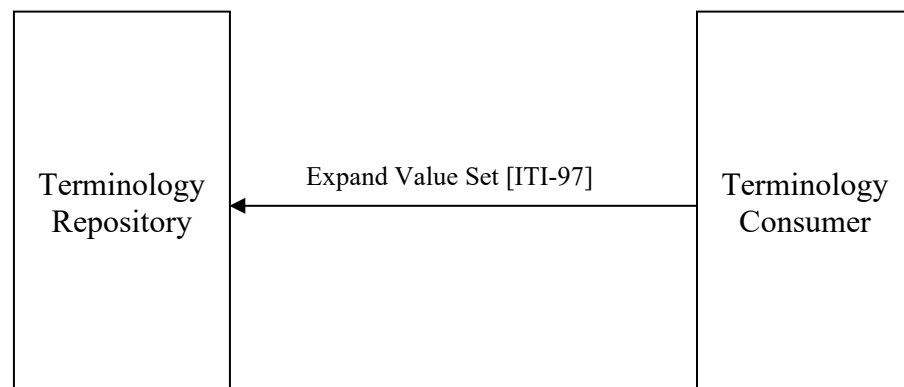
Figure 51.4.2.1.1-1: Discovery interaction diagram

51.4.2.2 Use Case #2 - Expand a Value Set

445 In this use case, a point of service system is providing a list of codes to provide decision support to a clinician prescribing medications.

51.4.2.2.1 Expand a Value Set Use Case Description

450 A clinician uses a computerized physician order entry (CPOE) system to order opioid medications for an inpatient. A value set containing all of the opiate medication formulations that are considered to have abuse potential can be pulled to support clinical decision support in a health record system. Using a pre-assigned identifier, the CPOE system queries the Terminology Repository for an "expanded" Value Set to retrieve the list of codes based on the definition of the Value Set. The codes returned by an "expand" operation are suitable for providing decision support and validation.



455

Figure 51.4.2.2.1-1: Expand a Value Set Use Case Diagram

51.4.2.3 Use Case #3 - Look up a code

In this use case, a Terminology Consumer asks a Terminology Repository for details about a particular code system/code combination.

51.4.2.3.1 Look up a code Use Case Description

A physician updates a patient's problems list (conditions) at a point of service terminal. After a code is entered, the point of service terminal—the Terminology Consumer—queries a Terminology Repository to retrieve the full details of the code using the lookup operation. The Terminology Repository returns information for both display and processing purposes, such as a longer narrative description along with inclusions and exclusions, allowing the physician to verify that she entered the correct code and to make a correction if necessary.

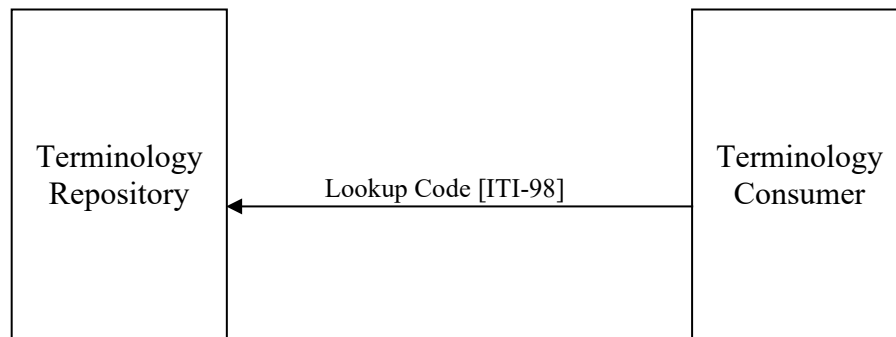


Figure 51.4.2.3.1-1: Look up a Concept Use Case Diagram

51.4.2.4 Use Case #4 - Validate a code

In this use case, a point of service system verifies whether a code is a valid member of a value set.

51.4.2.4.1 Validate a code Use Case Description

A health system publishes value sets consisting of codes relevant to particular clinical contexts and related procedures. Value sets are updated periodically to represent changes in clinical practice and available medicines and supplies. Before submitting an update to a patient record, an electronic medical record system checks a code through the Terminology Repository to validate each medical code. The Terminology Repository returns true/false indicating whether a code/concept is in the set of codes associated with a value set.

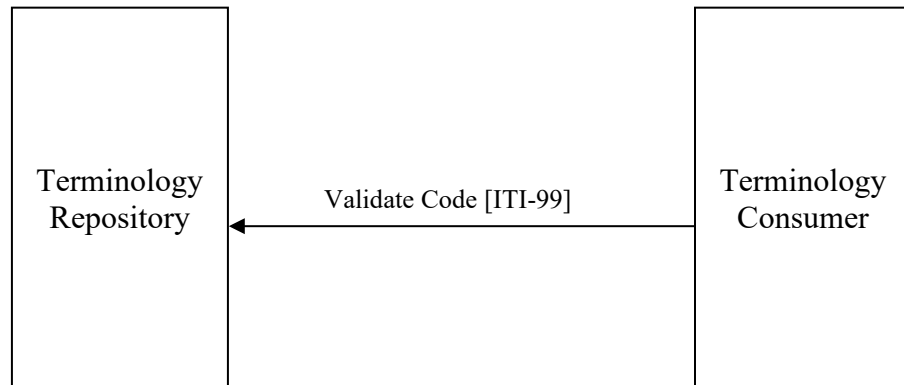


Figure 51.4.2.4.1-1: Validate a Code Use Case Diagram

51.4.2.5 Use Case #5 - Translate a code

485 In this use case, a concept is translated from a source code system, possibly a proprietary local terminology, to a target code system, such as LOINC.

51.4.2.5.1 Translate a Code Use Case Description

490 In this example, an ambulatory clinic might refer to a lab test as a “white count”. To report and analyze these tests accurately, the clinic must submit its data using a shared terminology standard used within the health system, such as LOINC. The clinic’s reporting system queries a Terminology Repository to translate its local “white count” concept to a LOINC concept using a pre-loaded Concept Map, which defines relationships between concepts in a source Code System and one or more target Code Systems. The Terminology Repository returns LOINC 6690-2 “Leukocytes [# /volume] in Blood by Automated count”.

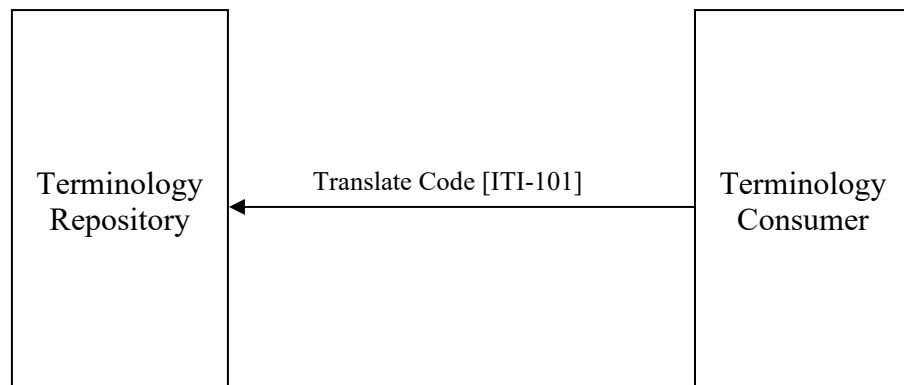


Figure 51.4.2.5.1-1: Translate a Code Use Case Diagram

51.5 SVCN Security Considerations

500 The contents handled by the SVCN Profile are not patient-specific, so there are no risks to patient privacy. Some Expanded Value Sets are of little value to an attacker as they are public tables of non-critical information (e.g., Expanded Value Sets used for coding of body parts in medical exams). Other Expanded Value Sets might need protection against malicious
505 modification or interception. For example, there can be integrity risks such as masquerade, or the modification of Expanded Value Sets. Another possible type of risk would be at the privacy and confidentiality level, such as the interception of an Expanded Value Set containing confidential data. The profile will allow mitigation of those risks when needed in the following manner:

- 510 • A Terminology Repository shall be grouped with an ATNA Secure Node or Secure Application. Since the Terminology Consumer is not required to be grouped with the Secure Node or Secure Application, the Terminology Repository shall support both secure and non-secure connections.
- Terminology Repositories shall be able to restrict access to a specific Expanded Value Set to authorized and authenticated nodes, while allowing unauthenticated network queries to other Expanded Value Sets.

See ITI TF-2x: Appendix Z.8 “Mobile Security Considerations”.

515 51.6 SVCN Cross Profile Considerations

None

Appendices to Volume 1

Not applicable

520

Volume 2c – Transactions (cont.)

Add Section 3.95

3.95 Query Value Set [ITI-95]

525 This section corresponds to transaction [ITI-95] of the IHE IT Infrastructure Technical Framework. Transaction [ITI-95] is used by the Terminology Consumer and Terminology Repository Actors.

3.95.1 Scope

530 This transaction is used by the Terminology Consumer to find value sets based on criteria it provides in the query parameters of the request message, or to retrieve a specific value set. The request is received by the Terminology Repository. The Terminology Repository processes the request and returns a response of the matching value sets.

3.95.2 Actor Roles

Table 3.95.2-1: Actor Roles

Actor:	Terminology Consumer
Role:	Requests value set(s) matching the supplied set of criteria from the Terminology Repository.
Actor:	Terminology Repository
Role:	Returns information for value set(s) matching the criteria provided by the Terminology Consumer.

535 3.95.3 Referenced Standards

HL7 FHIR	HL7 FHIR standard R4 http://hl7.org/fhir/R4/index.html
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3.95.4 Messages

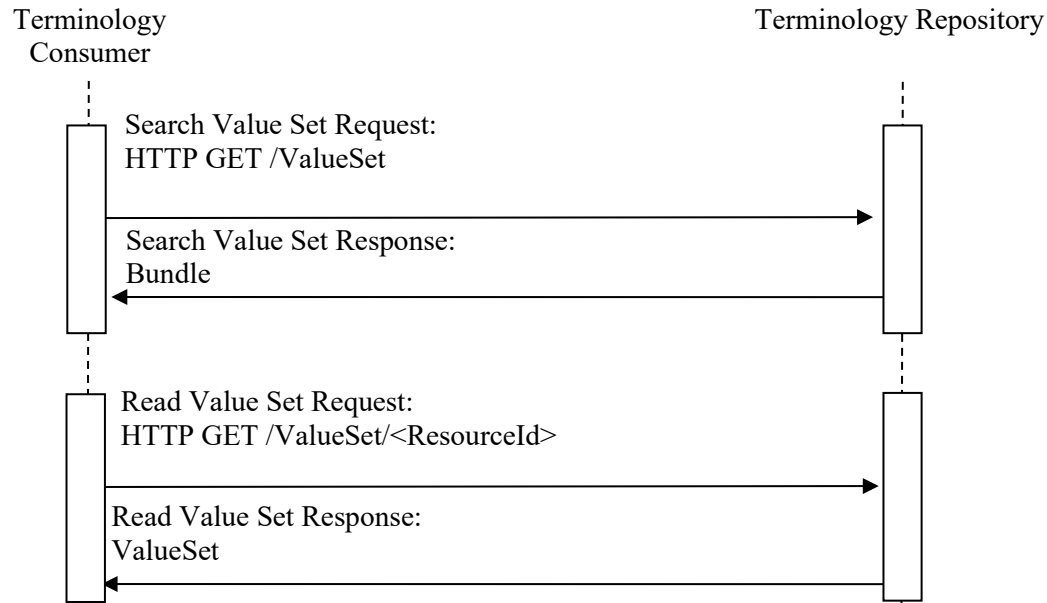


Figure 3.95.4-1: Interaction Diagram

3.95.4.1 Search Value Set Request Message

The Search Value Set message is a FHIR search interaction on the ValueSet Resource.

3.95.4.1.1 Trigger Events

A Terminology Consumer triggers a Search Value Set Request to a Terminology Repository according to the business rules for the search. These business rules are outside the scope of this transaction.

3.95.4.1.2 Message Semantics

A Terminology Consumer initiates a search interaction using HTTP GET as defined at <http://hl7.org/fhir/R4/http.html#search> on the ValueSet. The query parameters are identified below. A Terminology Consumer may query any combination or subset of the parameters. The target is formatted as:

GET [base]/ValueSet?[parameter=value]

Where [base] is the URL of Terminology Repository.

A Terminology Repository shall support combinations of search parameters as defined at <http://hl7.org/fhir/R4/search.html#combining>, “Composite Search Parameters.”

A Terminology Repository shall support responding to a request for both the JSON and the XML messaging formats as defined in FHIR. A Terminology Consumer shall accept either the JSON or the XML messaging formats as defined in FHIR. See ITI TF-2x: Appendix Z.6 for more details.

- 560 A Terminology Repository shall implement the parameters described below. A Terminology Repository may choose to support additional query parameters beyond the subset listed below. Any additional query parameters supported shall be supported according to the core FHIR specification.

See ITI TF-2x: Appendix W for informative implementation material for this transaction.

565 **3.95.4.1.2.1 Query Parameters**

The Terminology Repository shall support the `:contains` and `:exact` modifiers in all of the string query parameters below defined at <http://hl7.org/fhir/R4/search.html#string>.

The Terminology Repository shall support the following search parameters as defined at <http://hl7.org/fhir/R4/search.html#all> and <http://hl7.org/fhir/R4/valueset.html#search>.

- 570 `_id`
`_lastUpdated`
`status`
`identifier`
`name`
575 `description`
`reference`
`title`
`url`
`version`

- 580 The Terminology Repository shall also support the following prefixes for the `_lastUpdated` parameter: `gt`, `lt`, `ge`, `le`, `sa`, and `eb`.

3.95.4.1.3 Expected Actions

The Terminology Repository shall process the query to discover the value sets that match the search parameters given, and return a response as per Section 3.95.4.2 or an error as per

- 585 <http://hl7.org/fhir/R4/search.html#errors>.

3.95.4.2 Search Value Set Response Message

3.95.4.2.1 Trigger Events

The Terminology Repository found value sets matching the query parameters specified by the Terminology Consumer as a result of a Search Value Set Request.

590 3.95.4.2.2 Message Semantics

The Terminology Repository shall support the search response message as defined at <http://hl7.org/fhir/R4/http.html#search> on the ValueSet, as defined at <http://hl7.org/fhir/R4/valueset.html>

595 The “content-type” of the response will depend upon the requested response format indicated by the Terminology Consumer.

See ITI TF-2x: Appendix Z.6 for more details on response format handling. See ITI TF-2x: Appendix Z.7 for handling guidance for Access Denied.

3.95.4.2.3 Expected Actions

The Terminology Consumer has received the response and continues with its workflow.

600 3.95.4.3 Read Value Set Request Message

This message represents an HTTP GET from the Terminology Consumer to the Terminology Repository and provides a mechanism for retrieving a single ValueSet with a known resource id.

3.95.4.3.1 Trigger Events

605 When the Terminology Consumer possesses the `id` of ValueSet (either through query, database lookup, or other mechanism) for which it requires additional or new information, it issues a Read Value Set Request.

3.95.4.3.2 Message Semantics

A Terminology Consumer initiates a read interaction using HTTP GET as defined at <http://hl7.org/fhir/R4/http.html#read> on the ValueSet Resource. The target is formatted as:

610 GET [base]/ValueSet/[resourceId]

Where [base] is the URL of Terminology Repository.

615 The `resourceId` included in the request always represents the unique id for the ValueSet within the scope of the URL. For example, while `http://example1.org/ihe/ValueSet/1` and `http://example2.com/ihe/ValueSet/1` both contain the same [resourceId], they reference two different resource instances.

Note: The use of "http" or "https" in URL does not override requirements to use TLS for security purposes.

A Terminology Repository shall support responding to a request for both the JSON and the XML messaging formats as defined in FHIR. A Terminology Consumer shall accept either the JSON or the XML messaging formats as defined in FHIR. See ITI TF-2x: Appendix Z.6 for more details.

See ITI TF-2x: Appendix W for informative implementation material for this transaction.

3.95.4.3.3 Expected Actions

The Terminology Repository shall process the request to retrieve the ValueSet that matches the given resource `id`, and return a response as defined at <http://hl7.org/fhir/R4/http.html#read> or an error code as defined at <http://hl7.org/fhir/http.html#Status-Codes>.

3.95.4.4 Read Value Set Response Message

The Terminology Repository's response to a successful Read Value Set message shall be an **HTTP 200** (OK) Status code with a ValueSet Resource, or an appropriate error status code, optionally with an OperationOutcome Resource.

3.95.4.4.1 Trigger Events

The Terminology Repository found a ValueSet Resource matching the resource identifier specified by the Terminology Consumer.

3.95.4.4.2 Message Semantics

The Read Value Set Response is sent from the Terminology Repository to the Terminology Consumer as a single ValueSet, as defined at <http://hl7.org/fhir/R4/valueset.html>

The “content-type” of the response will depend upon the requested response format indicated by the Terminology Consumer.

See ITI TF-2x: Appendix Z.6 for more details on response format handling. See ITI TF-2x: Appendix Z.7 for handling guidance for Access Denied.

If the Terminology Repository is unable to produce a response in the requested format, it shall respond with an **HTTP 4xx** error indicating that it was unable to fulfill the request. The Terminology Repository may be capable of servicing requests for response formats not listed, but shall, at minimum, be capable of producing XML and JSON encodings.

3.95.4.4.3 Expected Actions

The Terminology Consumer has received the response and continues with its workflow.

3.95.5 Security Considerations

See the general Security Consideration in ITI TF-1: 51.5.

650 *Add Section 3.96*

3.96 Query Code System [ITI-96]

This section corresponds to transaction [ITI-96] of the IHE IT Infrastructure Technical Framework. Transaction [ITI-96] is used by the Terminology Consumer and Terminology Repository Actors.

3.96.1 Scope

This transaction is used by the Terminology Consumer to solicit information about code systems whose data match data provided in the query parameters on the request message. The request is received by the Terminology Repository. The Terminology Repository processes the request and returns a response of the matching code systems.

3.96.2 Actor Roles

Table 3.96.2-1: Actor Roles

Actor:	Terminology Consumer
Role:	Requests code system(s) matching the supplied set of criteria from the Terminology Repository.
Actor:	Terminology Repository
Role:	Returns information for code system(s) matching the criteria provided by the Terminology Consumer.

3.96.3 Referenced Standards

HL7 FHIR	HL7 FHIR standard R4 http://hl7.org/fhir/R4/index.html
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665 **3.96.4 Messages**

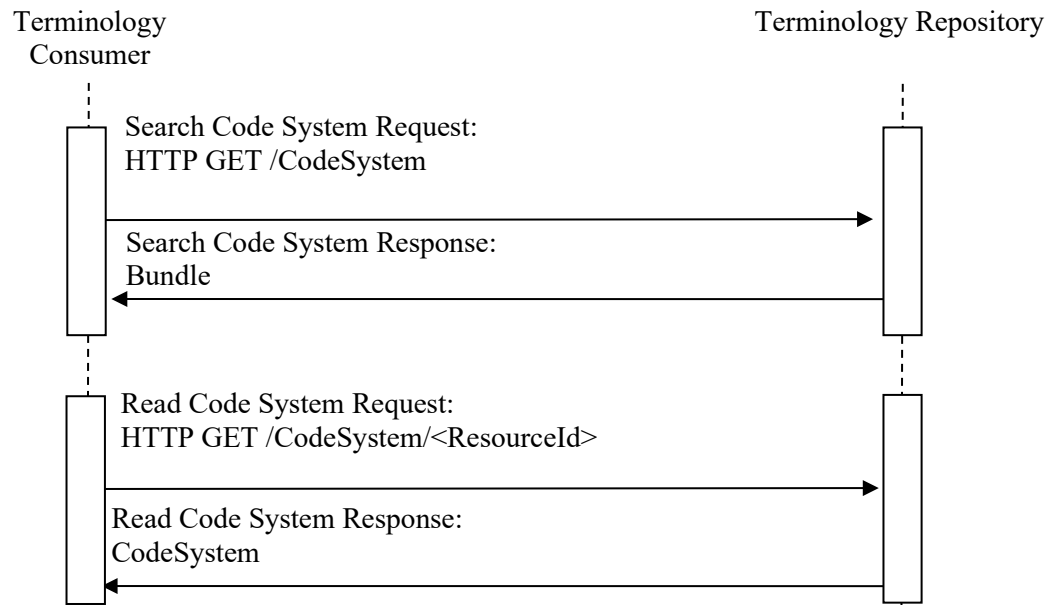


Figure 3.96.4-1: Interaction Diagram

3.96.4.1 Search Code System Request Message

The Search Code System message is a FHIR search interaction on the CodeSystem Resource.

670 **3.96.4.1.1 Trigger Events**

A Terminology Consumer triggers a Search Code System Request to a Terminology Repository according to the business rules for the search. These business rules are outside the scope of this transaction.

3.96.4.1.2 Message Semantics

675 A Terminology Consumer initiates a search interaction using HTTP GET as defined at <http://hl7.org/fhir/R4/http.html#search> on the CodeSystem. The query parameters are identified below. A Terminology Consumer may query any combination or subset of the parameters. The target is formatted as:

GET [base]/CodeSystem?[parameter=value]

680 Where [base] is the URL of Terminology Repository.

A Terminology Repository shall support combinations of search parameters as defined at <http://hl7.org/fhir/R4/search.html#combining>, “Composite Search Parameters.”

685 A Terminology Repository shall support responding to a request for both the JSON and the XML messaging formats as defined in FHIR. A Terminology Consumer shall accept either the JSON or the XML messaging formats as defined in FHIR. See ITI TF-2x: Appendix Z.6 for more details.

690 A Terminology Repository shall implement the parameters described below. A Terminology Repository may choose to support additional query parameters beyond the subset listed below. Any additional query parameters supported shall be supported according to the core FHIR specification.

See ITI TF-2x: Appendix W for informative implementation material for this transaction.

3.96.4.1.2.1 Query Parameters

The Terminology Repository shall support the `:contains` and `:exact` modifiers in all of the string query parameters below defined at <http://hl7.org/fhir/R4/search.html#string>.

695 The Terminology Repository shall support the following search parameters as defined at <http://hl7.org/fhir/R4/search.html#all> and <http://hl7.org/fhir/R4/codesystem.html#search>.

700 `_id`
`_lastUpdated`
`status`
`identifier`
`name`
`description`
`system`
`title`
705 `url`
`version`

The Terminology Repository shall also support the following prefixes for the `_lastUpdated` parameter: `gt`, `lt`, `ge`, `le`, `sa`, and `eb`.

3.96.4.1.3 Expected Actions

710 The Terminology Repository shall process the query to discover the code systems that match the search parameters given, and return a response as per Section 3.96.4.2 or an error as per <http://hl7.org/fhir/R4/search.html#errors>.

3.96.4.2 Search Code System Response Message

3.96.4.2.1 Trigger Events

715 The Terminology Repository found code systems matching the query parameters

specified by the Terminology Consumer as a result of a Search Code System Request.

3.96.4.2.2 Message Semantics

The Terminology Repository shall support the search response message as defined at <http://hl7.org/fhir/R4/http.html#search> on the CodeSystem, as defined at <http://hl7.org/fhir/R4/codesystem.html>.

The “content-type” of the response will depend upon the requested response format indicated by the Terminology Consumer.

See ITI TF-2x: Appendix Z.6 for more details on response format handling. See ITI TF-2x: Appendix Z.7 for handling guidance for Access Denied.

3.96.4.2.3 Expected Actions

The Terminology Consumer has received the response and continues with its workflow.

3.96.4.3 Read Code System Request Message

This message represents an HTTP GET from the Terminology Consumer to the Terminology Repository and provides a mechanism for retrieving a single CodeSystem with a known resource id.

3.96.4.3.1 Trigger Events

When the Terminology Consumer possesses the `id` of the CodeSystem (either through query, database lookup, or other mechanism) for which it requires additional or new information, it issues a Read Code System Request.

3.96.4.3.2 Message Semantics

A Terminology Consumer initiates a read interaction using HTTP GET as defined at <http://hl7.org/fhir/R4/http.html#read> on the CodeSystem Resource. The target is formatted as:

GET [base]/CodeSystem/[resourceId]

Where [base] is the URL of Terminology Repository.

The `resourceId` included in the request always represents the unique id for the CodeSystem within the scope of the URL. For example, while `http://example1.org/ihe/CodeSystem/1` and `http://example2.com/ihe/CodeSystem/1` both contain the same [resourceId], they reference two different resource instances.

Note: The use of "http" or "https" in URL does not override requirements to use TLS for security purposes.

A Terminology Repository shall support responding to a request for both the JSON and the XML messaging formats as defined in FHIR. A Terminology Consumer shall accept either the JSON

or the XML messaging formats as defined in FHIR. See ITI TF-2x: Appendix Z.6 for more details.

750 See ITI TF-2x: Appendix W for informative implementation material for this transaction.

3.96.4.3.3 Expected Actions

The Terminology Repository shall process the request to retrieve the CodeSystem that matches the given resource id, and return a response as defined at <http://hl7.org/fhir/R4/http.html#read> or an error code as defined at <http://hl7.org/fhir/http.html#Status-Codes>.

755 3.96.4.4 Read Code System Response Message

The Terminology Repository's response to a successful Read Code System message shall be an **HTTP 200** (OK) Status code with a CodeSystem Resource, or an appropriate error status code, optionally with an OperationOutcome Resource.

3.96.4.4.1 Trigger Events

760 The Terminology Repository found a CodeSystem Resource matching the resource identifier specified by the Terminology Consumer.

3.96.4.4.2 Message Semantics

The Read Code System Response is sent from the Terminology Repository to the Terminology Consumer as a single CodeSystem, as defined at <http://hl7.org/fhir/R4/codesystem.html>

765 The "content-type" of the response will depend upon the requested response format indicated by the Terminology Consumer.

See ITI TF-2x: Appendix Z.6 for more details on response format handling. See ITI TF-2x: Appendix Z.7 for handling guidance for Access Denied.

770 If the Terminology Repository is unable to produce a response in the requested format, it shall respond with an **HTTP 4xx** error indicating that it was unable to fulfill the request. The Terminology Repository may be capable of servicing requests for response formats not listed, but shall, at minimum, be capable of producing XML and JSON encodings.

3.96.4.4.3 Expected Actions

The Terminology Consumer has received the response and continues with its workflow.

775 3.96.5 Security Considerations

See the general Security Consideration in ITI TF-1: 51.5.

<i>Add Section 3.97</i>

3.97 Expand Value Set [ITI-97]

780 This section corresponds to transaction [ITI-97] of the IHE IT Infrastructure Technical Framework. Transaction [ITI-97] is used by the Terminology Consumer and Terminology Repository Actors.

3.97.1 Scope

785 This transaction is used by the Terminology Consumer to expand a given ValueSet to return the full list of concepts available in that ValueSet. The request is received by the Terminology Repository. The Terminology Repository processes the request and returns a response of the expanded ValueSet.

3.97.2 Actor Roles

Table 3.97.2-1: Actor Roles

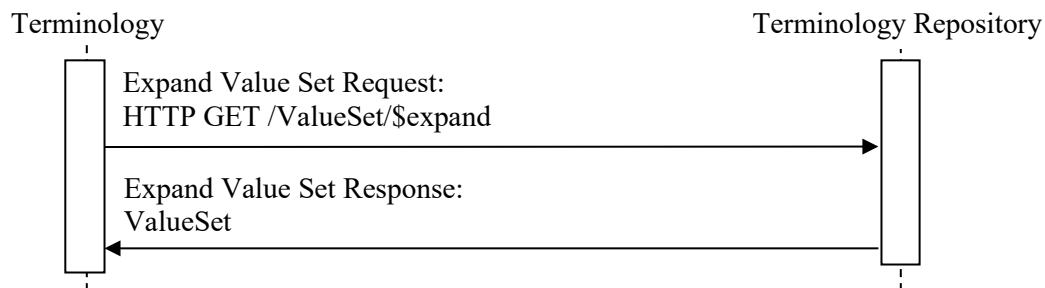
Actor:	Terminology Consumer
Role:	Requests an expanded ValueSet from the Terminology Repository.
Actor:	Terminology Repository
Role:	Returns information for the expanded ValueSet based on criteria provided by the Terminology Consumer.

790

3.97.3 Referenced Standards

HL7 FHIR	HL7 FHIR standard R4 http://hl7.org/fhir/R4/index.html
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3.97.4 Messages



795

Figure 3.97.4-1: Interaction Diagram

3.97.4.1 Expand Value Set Request Message

The Expand Value Set Request message is a FHIR \$expand operation on the ValueSet Resource.

3.97.4.1.1 Trigger Events

800 A Terminology Consumer triggers an Expand Value Set Request to a Terminology Repository according to the business rules for the expansion. These business rules are outside the scope of this transaction.

3.97.4.1.2 Message Semantics

805 A Terminology Consumer initiates an \$expand request using HTTP GET as defined at <http://hl7.org/fhir/valueset-operation-expand.html> on the ValueSet Resource. The required input parameters are identified in Table 3.97.4.1.2-1.

The URL for this operation is: [base]/ValueSet/\$expand?[parameter=value]

Where [base] is the URL of Terminology Repository.

See ITI TF-2x: Appendix W for informative implementation material for this transaction.

810 **Table 3.97.4.1.2-1: Expand Value Set Message HTTP Input Parameters**

Input Parameter Name	IHE Constraint	Search Type	Description
url [0..1]	[1..1]	uri	A canonical reference to a value set. The server must know the value set (e.g., it is defined explicitly in the server's value sets, or it is defined implicitly by some code system known to the server).
_format [0..1]		mime-type	The requested format of the response from the mime-type value set. See ITI TF-2x: Appendix Z.6.
valueSet [0..1]	[0..0] This parameter is not allowed when the url is used.	ValueSet	
valueSetVersion [0..1]	[0..1]	string	The identifier that is used to identify a specific version of the value set to be used when generating the expansion. This is an arbitrary value managed by the value set author and is not expected to be globally unique. For example, it might be a timestamp (e.g., yyyyymmdd) if a managed version is not available.
context [0..1]	[0..0] This parameter is not allowed when the url is used.	uri	

Input Parameter Name	IHE Constraint	Search Type	Description
contextDirection [0..1]	[0..0] This parameter is used with the context parameter which is not used.	code	
filter [0..1]		string	A text filter that is applied to restrict the codes that are returned (this is useful in a UI context). The interpretation of this is delegated to the server in order to allow to determine the most optimal search approach for the context. The server can document the way this parameter works in TerminologyCapabilities.expansion.textFilter. Typical usage of this parameter includes functionality like: • using left matching e.g., "acut ast" • allowing for wild cards such as %, &, ? • searching on definition as well as display(s) • allowing for search conditions (and / or / exclusions) Text Search engines such as Lucene or Solr, long with their considerable functionality, might also be used. The optional text search might also be code system specific, and servers might have different implementations for different code systems.
date [0..1]		dateTime	The date for which the expansion should be generated. if a date is provided, it means that the server should use the value set / code system definitions as they were on the given date, or return an error if this is not possible. Normally, the date is the current conditions (which is the default value) but under some circumstances, systems need to generate an expansion as it would have been in the past. A typical example of this would be where code selection is constrained to the set of codes that were available when the patient was treated, not when the record is being edited. Note that which date is appropriate is a matter for implementation policy.
offset [0..1]		integer	Paging support - where to start if a subset is desired (default = 0). Offset is number of records (not number of pages)
count [0..1]		integer	Paging support - how many codes should be provided in a partial page view. Paging only applies to flat expansions - servers ignore paging if the expansion is not flat. If count = 0, the client is asking how large the expansion is. Servers SHOULD honor this request for hierarchical expansions as well, and simply return the overall count.
includeDesignations [0..1]		boolean	Controls whether concept designations are to be included or excluded in value set expansions.

Input Parameter Name	IHE Constraint	Search Type	Description
designation [0..*]		string	A token that specifies a system+code that is either a use or a language. Designations that match by language or use are included in the expansion. If no designation is specified, it is at the server discretion which designations to return.
includeDefinition [0..1]		boolean	Controls whether the value set definition is included or excluded in value set expansions.
activeOnly [0..1]		boolean	Controls whether inactive concepts are included or excluded in value set expansions. Note that if the value set explicitly specifies that inactive codes are included, this parameter can still remove them from a specific expansion, but this parameter cannot include them if the value set excludes them
excludeNested [0..1]		boolean	Controls whether or not the value set expansion nests codes or not (i.e., ValueSet.expansion.contains.contains)
excludeNotForUI [0..1]		boolean	Controls whether or not the value set expansion is assembled for a user interface use or not. Value sets intended for User Interface might include 'abstract' codes or have nested contains with items with no code or abstract = true, with the sole purpose of helping a user navigate through the list efficiently, where as a value set not generated for UI use might be flat, and only contain the selectable codes in the value set. The exact implications of 'for UI' depend on the code system, and what properties it exposes for a terminology server to use. In the FHIR Specification itself, the value set expansions are generated with excludeNotForUI = false, and the expansions used when generated schema / code etc., or performing validation, are all excludeNotForUI = true.
excludePostCoordinate [0..1]		boolean	Controls whether or not the value set expansion includes post coordinated codes.
displayLanguage [0..1]		code	Specifies the language to be used for description in the expansions i.e., the language to be used for ValueSet.expansion.contains.display.
exclude-system [0..*]		canonical	Code system, or a particular version of a code system to be excluded from the value set expansion. The format is the same as a canonical URL: [system]][version] - e.g., http://loinc.org 2.56
system-version [0..*]		canonical	Specifies a version to use for a system, if the value set does not specify which one to use. The format is the same as a canonical URL: [system]][version] - e.g., http://loinc.org 2.56
check-system-version [0..*]		canonical	Edge Case: Specifies a version to use for a system. If a value set specifies a different version, an error is returned instead of the expansion. The format is the same as a canonical URL: [system]][version] - e.g., http://loinc.org 2.56

Input Parameter Name	IHE Constraint	Search Type	Description
force-system-version [0..*]		canonical	Edge Case: Specifies a version to use for a system. This parameter overrides any specified version in the value set (and any it depends on). The format is the same as a canonical URL: [system][version] - e.g., http://loinc.org 2.56 . Note that this has obvious safety issues, in that it may result in a value set expansion giving a different list of codes that is both wrong and unsafe, and implementers should only use this capability reluctantly. It primarily exists to deal with situations where specifications have fallen into decay as time passes. If the value is override, the version used SHALL explicitly be represented in the expansion parameters.

3.97.4.1.2.1 Example Request Message

An example request message from <http://hl7.org/fhir/valueset-operation-expand.html> is:

```
GET [base]/ValueSet/$expand?url=http://acme.com/fhir/ValueSet/23
```

815 3.97.4.1.3 Expected Actions

The Terminology Repository shall process the input parameters to discover the ValueSet that matches the parameters given and return a response as per Section 3.97.4.2 or an OperationOutcome with an error message.

3.97.4.2 Expand Value Set Response Message

820 3.97.4.2.1 Trigger Events

The Terminology Repository found expanded value set matching the input parameters specified by the Terminology Consumer as a result of a Expand Value Set Request.

3.97.4.2.2 Message Semantics

825 See ITI TF-2x: Appendix Z.6 for more details on response format handling. See ITI TF-2x: Appendix Z.7 for handling guidance for Access Denied.

The response message is a FHIR ValueSet Resource with the `expansion` element populated with the expanded ValueSet concepts.

3.97.4.2.2.1 Example Response Message

An example response message from <http://hl7.org/fhir/valueset-operation-expand.html> is:

830

```
HTTP/1.1 200 OK
[other headers]

<ValueSet xmlns="http://hl7.org/fhir">
  <!-- the server SHOULD populate the id with a newly created UUID
    so clients can easily track a particular expansion -->
  <id value="43770626-f685-4ba8-8d66-fb63e674c467"/>
  <!-- no need for meta, though it is allowed for security labels, profiles -
->

  <!-- other value set details -->
  <expansion>
    <!-- when expanded -->
    <timestamp value="20141203T08:50:00+11:00"/>
    <contains>
      <!-- expansion contents -->
    </contains>
  </expansion>
</ValueSet>
```

3.97.4.2.3 Expected Actions

The Terminology Consumer has received the response and continues with its workflow.

3.97.5 Security Considerations

See the general Security Consideration in ITI TF-1: 51.5.

Add Section 3.98

3.98 Lookup Code [ITI-98]

This section corresponds to transaction [ITI-98] of the IHE IT Infrastructure Technical Framework. Transaction [ITI-98] is used by the Terminology Consumer and Terminology Repository Actors.

3.98.1 Scope

This transaction is used by the Terminology Consumer to lookup a given code to return the full details. The request is received by the Terminology Repository. The Terminology Repository processes the request and returns a response of the code details as a Parameters Resource.

865 **3.98.2 Actor Roles**

Table 3.98.2-1: Actor Roles

Actor:	Terminology Consumer
Role:	Requests code details from the Terminology Repository.
Actor:	Terminology Repository
Role:	Returns information for the code based on criteria provided by the Terminology Consumer.

3.98.3 Referenced Standards

HL7 FHIR	HL7 FHIR standard R4 http://hl7.org/fhir/R4/index.html
----------	--

870

3.98.4 Messages

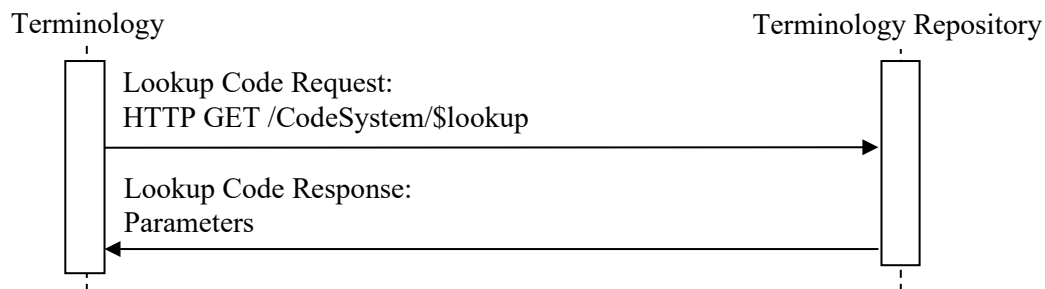


Figure 3.98.4-1: Interaction Diagram

3.98.4.1 Lookup Code Request Message

875 The Lookup Code Request message is a FHIR `$lookup` operation on the CodeSystem Resource.

3.98.4.1.1 Trigger Events

A Terminology Consumer triggers a Lookup Code Request to a Terminology Repository according to the business rules for the lookup. These business rules are outside the scope of this transaction.

880 3.98.4.1.2 Message Semantics

A Terminology Consumer initiates an \$lookup request using HTTP GET as defined at <http://hl7.org/fhir/codesystem-operation-lookup.html> on the CodeSystem Resource. The required input parameters are identified in Table 3.98.4.1.2-1.

The URL for this operation is: [base]/CodeSystem/\$lookup?[parameter=value]

885 Where [base] is the URL of Terminology Repository.

See ITI TF-2x: Appendix W for informative implementation material for this transaction.

Table 3.98.4.1.2-1: Lookup Code Message HTTP Input Parameters

Input Parameter Name	IHE Constraint	Search Type	Description
code [0..1]	[1..1]	code	The code that is to be located. If a code is provided, a system must be provided.
system [0..1]	[1..1]	uri	The system for the code that is to be located.
_format [0..1]		mime-type	The requested format of the response from the mime-type value set. See ITI TF-2x: Appendix Z.6.
version [0..1]		string	The version of the system, if one was provided in the source data.
coding [0..1]	[0..0] This parameter is not allowed when the code+system parameters are used.	Coding	
date [0..1]		dateTime	The date for which the information should be returned. Normally, this is the current conditions (which is the default value) but under some circumstances, systems need to access this information as it would have been in the past. A typical example of this would be where code selection is constrained to the set of codes that were available when the patient was treated, not when the record is being edited. Note that which date is appropriate is a matter for implementation policy.
displayLanguage [0..1]		code	The requested language for display (see \$expand.displayLanguage).
property [0..*]		code	A property that the client wishes to be returned in the output. If no properties are specified, the server chooses what to return. The following properties are defined for all code systems: url, name, version (code system info) and code information: display, definition, designation, parent and child, and for designations, lang.X where X is a designation language code. Some of the properties are returned explicit in named parameters (when the names match), and the rest (except for lang.X) in the property parameter group.

3.98.4.1.2.1 Example Request Message

An example request message from <http://hl7.org/fhir/codesystem-operation-lookup.html> is:

890

```
GET [base]/CodeSystem/$lookup?system=http://loinc.org&code=1963-8
```

3.98.4.1.3 Expected Actions

The Terminology Repository shall process the input parameters to discover the code that matches the parameters given and return a response as per Section 3.98.4.2 or an
895 OperationOutcome Resource with an error message.

3.98.4.2 Lookup Code Response Message

3.98.4.2.1 Trigger Events

The Terminology Repository found the code matching the input parameters specified by the Terminology Consumer as a result of a Lookup Code Request.

900

3.98.4.2.2 Message Semantics

See ITI TF-2x: Appendix Z.6 for more details on response format handling. See ITI TF-2x: Appendix Z.7 for handling guidance for Access Denied.

The response message is a FHIR Parameters Resource with properties of the code based on the out parameters defined at <http://hl7.org/fhir/codesystem-operation-lookup.html> and reproduced
905 in Table 3.98.4.2.2-1.

Table 3.98.4.2.2-1: Lookup Code Message HTTP Output Parameters

Parameter Name	Type	Description
name [1..1]	string	A display name for the code system
version [0..1]	string	The version that these details are based on
display [1..1]	string	The preferred display for this concept
designation [0..*]		Additional representations for this concept
designation.language [0..1]	code	The language this designation is defined for
designation.use [0..1]	Coding	A code that details how this designation would be used
designation.value [1..1]	string	The text value for this designation

Parameter Name	Type	Description
property [0..*]		One or more properties that contain additional information about the code, including status. For complex terminologies (e.g., SNOMED CT, LOINC, medications), these properties serve to decompose the code
property.code [1..1]	code	Identifies the property returned
property.value [0..1]	code Coding string integer boolean dateTime decimal	The value of the property returned
property.description [0..1]	string	Human Readable representation of the property value (e.g., display for a code)
property.subproperty [0..*]		Nested Properties (mainly used for SNOMED CT decomposition, for relationship Groups)
property.subproperty.code [1..1]	code	Identifies the sub-property returned
property.subproperty.value [1..1]	code Coding string integer boolean dateTime decimal	The value of the sub-property returned
property.subproperty.description [0..1]	string	Human Readable representation of the sub-property value (e.g., display for a code)

3.98.4.2.2.1 Example Response Message

An example successful response message from <http://hl7.org/fhir/codesystem-operation-lookup.html> is:

910

```
HTTP/1.1 200 OK
[other headers]

915 {
    "resourceType" : "Parameters",
    "parameter" : [
920     {
        "name" : "name",
        "valueString" : "LOINC"
925     },
     {
        "name" : "version",
        "valueString" : "2.48"
930     },
     {
        "name" : "display",
        "valueString" : "Bicarbonate [Moles/volume] in Serum"
935     },
     {
        "name" : "abstract",
        "valueString" : "false"
940     },
     {
        "name" : "designation",
        "part" : [
            {
                "name" : "value",
                "valueString" : "Bicarbonate [Moles/volume] in Serum"
            }
        ]
    }
  ]
}
```

945 An example failed response message from <http://hl7.org/fhir/codesystem-operation-lookup.html> is:

```
HTTP/1.1 200 OK
[other headers]

950 {
    "resourceType": "OperationOutcome",
    "id": "exception",
    "text": {
955     "status": "additional",
        "div": "<div xmlns=\"http://www.w3.org/1999/xhtml\">Code \"ABC-23\" not
found</div>"
    },
    "issue": [
960     {
        "severity": "error",
        "code": "not-found",
        "details": {
965         "text": "Code \"ABC-23\" not found"
        }
    }
    ]
}
```

3.98.4.2.3 Expected Actions

970 The Terminology Consumer has received the response and continues with its workflow.

3.98.5 Security Considerations

See the general Security Consideration in ITI TF-1: 51.5.

Add Section 3.99

975 3.99 Validate Code [ITI-99]

This section corresponds to transaction [ITI-99] of the IHE IT Infrastructure Technical Framework. Transaction [ITI-99] is used by the Terminology Consumer and Terminology Repository Actors.

3.99.1 Scope

980 This transaction is used by the Terminology Consumer to validate the existence of a given code in a value set or code system. The request is received by the Terminology Repository. The Terminology Repository processes the request and returns a response as a Parameters Resource.

3.99.2 Actor Roles

Table 3.99.2-1: Actor Roles

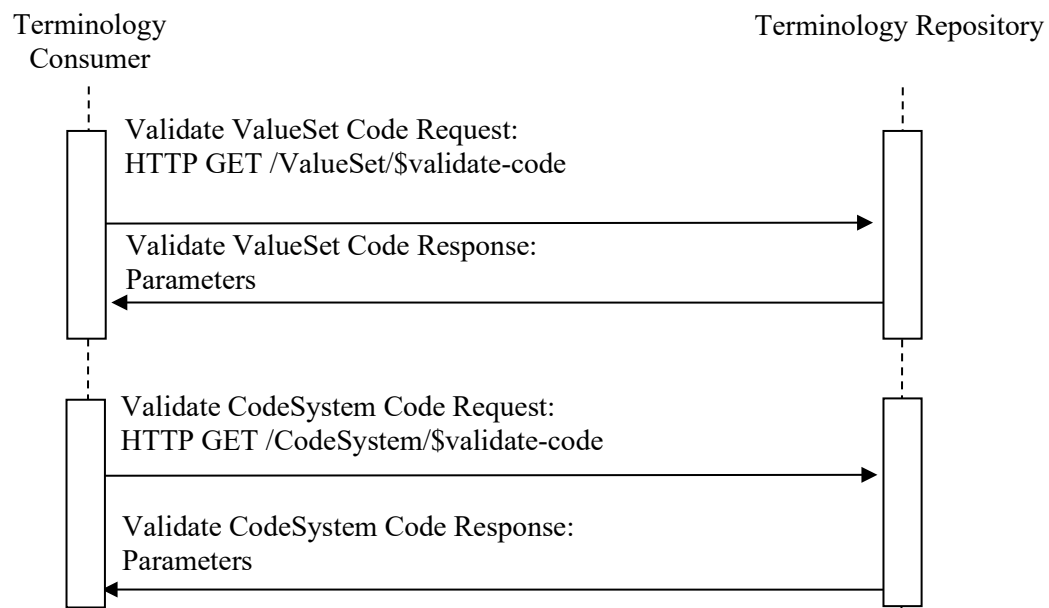
Actor:	Terminology Consumer
Role:	Requests the code to validate from the Terminology Repository.
Actor:	Terminology Repository
Role:	Returns validation information for the code provided by the Terminology Consumer.

985

3.99.3 Referenced Standards

HL7 FHIR	HL7 FHIR standard R4 http://hl7.org/fhir/R4/index.html
----------	--

3.99.4 Messages



990

Figure 3.99.4-1: Interaction Diagram

3.99.4.1 Validate ValueSet Code Request Message

The Validate ValueSet Code Request message is a FHIR \$validate-code operation on the ValueSet Resource.

995 **3.99.4.1.1 Trigger Events**

A Terminology Consumer triggers a Validate ValueSet Code Request to a Terminology Repository according to the business rules for the validation. These business rules are outside the scope of this transaction.

3.99.4.1.2 Message Semantics

1000 A Terminology Consumer initiates a \$validate-code request using HTTP GET as defined at <http://hl7.org/fhir/valueset-operation-validate-code.html> on the ValueSet Resource. The required input parameters are identified in Table 3.99.4.1.2-1.

The URL for this operation is: [base]/ValueSet/\$validate-code?[parameter=value]

Where [base] is the URL of Terminology Repository.

1005 See ITI TF-2x: Appendix W for informative implementation material for this transaction.

Table 3.99.4.1.2-1: Validate ValueSet Code Message HTTP Input Parameters

Input Parameter Name	IHE Constraint	Search Type	Description
url [0..1]	[1..1]	uri	Value set Canonical URL. The server must know the value set (e.g., it is defined explicitly in the server's value sets, or it is defined implicitly by some code system known to the server.
code [0..1]	[1..1]	code	The code that is to be validated. If a code is provided, a system or a context must be provided (if a context is provided, then the server SHALL ensure that the code is not ambiguous without a system).
system [0..1]	[1..1]	uri	The system for the code that is to be validated.
_format [0..1]	[0..1]	mime-type	The requested format of the response from the mime-type value set. See ITI TF-2x: Appendix Z.6.
context [0..1]	[0..0] This parameter is not allowed when the url parameter is used.	uri	
valueSet [0..1]	[0..0] This parameter is not allowed when the url parameter is used.	ValueSet	

Input Parameter Name	IHE Constraint	Search Type	Description
valueSetVersion [0..1]		string	The identifier that is used to identify a specific version of the value set to be used when validating the code. This is an arbitrary value managed by the value set author and is not expected to be globally unique. For example, it might be a timestamp (e.g., yyyyymmdd) if a managed version is not available.
systemVersion [0..1]		string	The version of the system, if one was provided in the source data
display [0..1]		string	The display associated with the code, if provided. If a display is provided a code must be provided. If no display is provided, the server cannot validate the display value, but may choose to return a recommended display name using the display parameter in the outcome. Whether displays are case sensitive is code system dependent
coding [0..1]	[0..0] This parameter is not allowed when the code+system parameters are used.	Coding	
codeableConcept [0..1]	[0..0] This parameter is not allowed when the code+system parameters are used.	Codeable Concept	
date [0..1]		dateTime	The date for which the validation should be checked. Normally, this is the current conditions (which is the default values) but under some circumstances, systems need to validate that a correct code was used at some point in the past. A typical example of this would be where code selection is constrained to the set of codes that were available when the patient was treated, not when the record is being edited. Note that which date is appropriate is a matter for implementation policy.

Input Parameter Name	IHE Constraint	Search Type	Description
abstract [0..1]		boolean	If this parameter has a value of true, the client is stating that the validation is being performed in a context where a concept designated as 'abstract' is appropriate/allowed to be used, and the server should regard abstract codes as valid. If this parameter is false, abstract codes are not considered to be valid. Note that 'abstract' is a property defined by many HL7 code systems that indicates that the concept is a logical grouping concept that is not intended to be used as a 'concrete' concept in an actual patient/care/process record. This language is borrowed from Object Oriented theory where 'abstract' objects are never instantiated. However, in the general record and terminology eco-system, there are many contexts where it is appropriate to use these codes e.g., as decision making criterion, or when editing value sets themselves. This parameter allows a client to indicate to the server that it is working in such a context.
displayLanguage [0..1]		code	Specifies the language to be used for description when validating the display property

3.99.4.1.3 Expected Actions

1010 The Terminology Repository shall process the input parameters to discover the code in the value set that matches the parameters given and return a response as per Section 3.99.4.2 or an OperationOutcome Resource with an error message.

3.99.4.2 Validate ValueSet Code Response Message

3.99.4.2.1 Trigger Events

1015 The Terminology Repository found validation details of the code matching the input parameters specified by the Terminology Consumer as a result of a Validate ValueSet Code Request.

3.99.4.2.2 Message Semantics

See ITI TF-2x: Appendix Z.6 for more details on response format handling. See ITI TF-2x: Appendix Z.7 for handling guidance for Access Denied.

1020 The response message is a FHIR Parameters Resource with properties of the code set based on the out parameters defined at <http://hl7.org/fhir/valueset-operation-validate-code.html> and reproduced in Table 3.99.4.2.2-1.

Table 3.99.4.2.2-1: Validate ValueSet Code Message HTTP Output Parameters

Parameter Name	Type	Description
result [1..1]	boolean	True if the concept details supplied are valid
message [0..1]	string	Error details, if result = false. If this is provided when result = true, the message carries hints and warnings
display [0..1]	string	A valid display for the concept if the system wishes to display this to a user

3.99.4.2.3 Expected Actions

- 1025 The Terminology Consumer has received the response and continues with its workflow.

3.99.4.3 Validate CodeSystem Code Request Message

The Validate CodeSystem Code Request message is a FHIR \$validate-code operation on the CodeSystem Resource.

3.99.4.3.1 Trigger Events

- 1030 A Terminology Consumer triggers a Validate CodeSystem Code Request to a Terminology Repository according to the business rules for the validation. These business rules are outside the scope of this transaction.

3.99.4.3.2 Message Semantics

- 1035 A Terminology Consumer initiates an \$validate-code request using HTTP GET as defined at <http://hl7.org/fhir/codesystem-operation-validate-code.html> on the CodeSystem Resource. The required input parameters are identified in Table 3.99.4.3.2-1.

The URL for this operation is: [base]/CodeSystem/\$validate-code

Where [base] is the URL of Terminology Repository.

See ITI TF-2x: Appendix W for informative implementation material for this transaction.

1040 **Table 3.99.4.3.2-1: Validate CodeSystem Code Message HTTP Input Parameters**

Input Parameter Name	IHE Constraint	Search Type	Description
url [0..1]	[1..1]	uri	CodeSystem URL. The server must know the code system (e.g., it is defined explicitly in the server's code systems, or it is known implicitly by the server.
code [0..1]	[1..1]	code	The code that is to be validated.

Input Parameter Name	IHE Constraint	Search Type	Description
<code>_format</code> [0..1]		mime-type	The requested format of the response from the mime-type value set. See ITI TF-2x: Appendix Z.6.
<code>codeSystem</code> [0..1]	[0..0] This parameter is not allowed when the url parameter is used.	CodeSystem	
<code>version</code> [0..1]		string	The version of the code system, if one was provided in the source data.
<code>display</code> [0..1]		string	The display associated with the code, if provided. If a display is provided a code must be provided. If no display is provided, the server cannot validate the display value, but may choose to return a recommended display name in an extension in the outcome. Whether displays are case sensitive is code system dependent.
<code>coding</code> [0..1]	[0..0] This parameter is not allowed when the code+url parameters are used.	Coding	
<code>codeableConcept</code> [0..1]	[0..0] This parameter is not allowed when the code+url parameters are used.	CodeableConcept	
<code>date</code> [0..1]		dateTime	The date for which the validation should be checked. Normally, this is the current conditions (which is the default values) but under some circumstances, systems need to validate that a correct code was used at some point in the past. A typical example of this would be where code selection is constrained to the set of codes that were available when the patient was treated, not when the record is being edited. Note that which date is appropriate is a matter for implementation policy.
<code>abstract</code> [0..1]		boolean	If this parameter has a value of true, the client is stating that the validation is being performed in a context where a concept designated as 'abstract' is appropriate/allowed to be used, and the server should regard abstract codes as valid. If this parameter is false, abstract codes are not considered to be valid.

Input Parameter Name	IHE Constraint	Search Type	Description
displayLanguage [0..1]		code	Specifies the language to be used for description when validating the display property

3.99.4.3.3 Expected Actions

1045 The Terminology Repository shall process the input parameters to discover the code in the code system that matches the parameters given and return a response as per Section 3.99.4.4 or an OperationOutcome Resource with an error message.

3.99.4.4 Validate CodeSystem Code Response Message

3.99.4.4.1 Trigger Events

The Terminology Repository found validation details of the code matching the input parameters specified by the Terminology Consumer as a result of a Validate CodeSystem Code Request.

1050 3.99.4.4.2 Message Semantics

See ITI TF-2x: Appendix Z.6 for more details on response format handling. See ITI TF-2x: Appendix Z.7 for handling guidance for Access Denied.

1055 The response message is a FHIR Parameters Resource with properties of the code set based on the out parameters defined at <http://hl7.org/fhir/codesystem-operation-validate-code.html> and reproduced in Table 3.99.4.4.2-1.

Table 3.99.4.4.2-1: Validate CodeSystem Code Message HTTP Output Parameters

Parameter Name	Type	Description
result [1..1]	boolean	True if the concept details supplied are valid
message [0..1]	string	Error details, if result = false. If this is provided when result = true, the message carries hints and warnings
display [0..1]	string	A valid display for the concept if the system wishes to display this to a user

3.99.4.4.3 Expected Actions

The Terminology Consumer has received the response and continues with its workflow.

1060 3.99.5 Security Considerations

See the general Security Consideration in ITI TF-1: 51.5.

Add Section 3.100

3.100 Query Concept Map [ITI-100]

1065 This section corresponds to transaction [ITI-100] of the IHE IT Infrastructure Technical Framework. Transaction [ITI-100] is used by the Terminology Consumer and Terminology Repository Actors.

3.100.1 Scope

1070 This transaction is used by the Terminology Consumer that supports the Translate Option to solicit information about concept maps whose data match data provided in the query parameters on the request message. The request is received by the Terminology Repository that supports the Translate Option. The Terminology Repository processes the request and returns a response of the matching concept maps.

3.100.2 Actor Roles

Table 3.100.2-1: Actor Roles

Actor:	Terminology Consumer
Role:	Requests concept map(s) matching the supplied set of criteria from the Terminology Repository.
Actor:	Terminology Repository
Role:	Returns information for concept map(s) matching the criteria provided by the Terminology Consumer.

1075 3.100.3 Referenced Standards

HL7 FHIR	HL7 FHIR standard R4 http://hl7.org/fhir/R4/index.html
----------	--

3.100.4 Messages

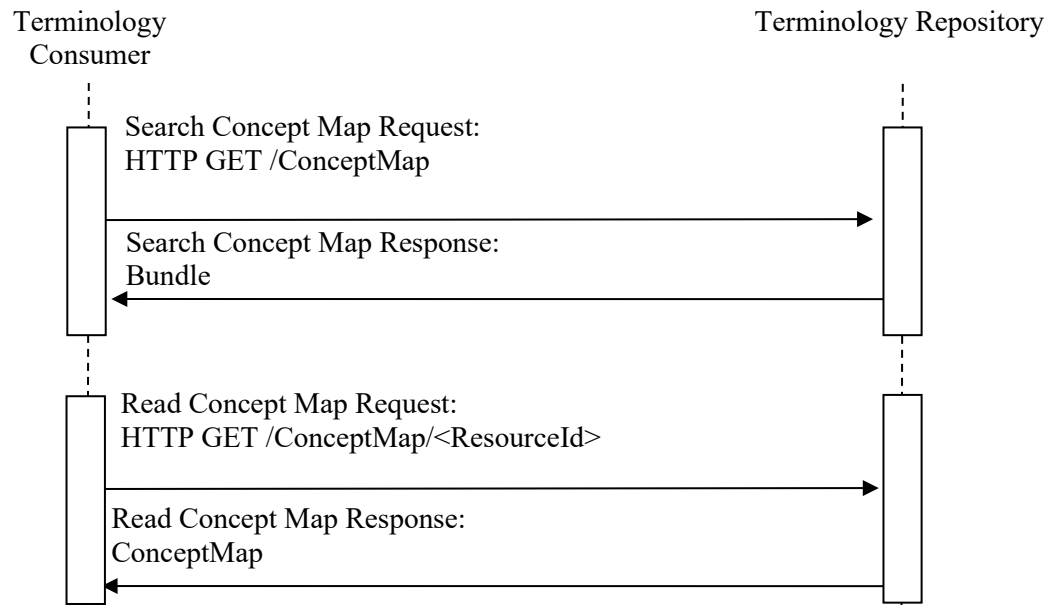


Figure 3.100.4-1: Interaction Diagram

3.100.4.1 Search Concept Map Request Message

The Search Concept Map message is a FHIR search interaction on the ConceptMap Resource.

3.100.4.1.1 Trigger Events

A Terminology Consumer triggers a Search Concept Map Request to a Terminology Repository according to the business rules for the search. These business rules are outside the scope of this transaction.

3.100.4.1.2 Message Semantics

A Terminology Consumer initiates a search interaction using HTTP GET as defined at <http://hl7.org/fhir/R4/http.html#search> on the ConceptMap. The query parameters are identified below. A Terminology Consumer may query any combination or subset of the parameters. The target is formatted as:

```
GET [base]/ConceptMap?[parameter=value]
```

Where [base] is the URL of Terminology Repository.

A Terminology Repository shall support combinations of search parameters as defined at <http://hl7.org/fhir/R4/search.html#combining>, “Composite Search Parameters.”

A Terminology Repository shall support responding to a request for both the JSON and the XML messaging formats as defined in FHIR. A Terminology Consumer shall accept either the JSON or the XML messaging formats as defined in FHIR. See ITI TF-2x: Appendix Z.6 for more details.

- 1100 A Terminology Repository shall implement the parameters described below. A Terminology Repository may choose to support additional query parameters beyond the subset listed below. Any additional query parameters supported shall be supported according to the core FHIR specification.

See ITI TF-2x: Appendix W for informative implementation material for this transaction.

1105 **3.100.4.1.2.1 Query Parameters**

The Terminology Repository shall support the `:contains` and `:exact` modifiers in all of the string query parameters below defined at <http://hl7.org/fhir/R4/search.html#string>.

The Terminology Repository shall support the following search parameters as defined at <http://hl7.org/fhir/R4/search.html#all> and <http://hl7.org/fhir/R4/conceptmap.html#search>.

- 1110 `_id`
`_lastUpdated`
`status`
`identifier`
`name`
1115 `description`
`title`
`url`
`version`
`source-system`
1120 `source-uri`
`target-system`
`target-uri`

The Terminology Repository shall also support the following prefixes for the `_lastUpdated` parameter: `gt`, `lt`, `ge`, `le`, `sa`, and `eb`.

1125 **3.100.4.1.3 Expected Actions**

The Terminology Repository shall process the query to discover the concept maps that match the search parameters given, and return a response as per Section 3.100.4.2 or an error as per <http://hl7.org/fhir/R4/search.html#errors>.

3.100.4.2 Search Concept Map Response message

1130 3.100.4.2.1 Trigger Events

The Terminology Repository found concept maps matching the query parameters specified by the Terminology Consumer as a result of a Search Concept Map Request.

3.100.4.2.2 Message Semantics

1135 The Terminology Repository shall support the search response message as defined at <http://hl7.org/fhir/R4/http.html#search> on the ConceptMap, as defined at <http://hl7.org/fhir/R4/conceptmap.html>

The “content-type” of the response will depend upon the requested response format indicated by the Terminology Consumer.

1140 See ITI TF-2x: Appendix Z.6 for more details on response format handling. See ITI TF-2x: Appendix Z.7 for handling guidance for Access Denied.

3.100.4.2.3 Expected Actions

The Terminology Consumer has received the response and continues with its workflow.

3.100.4.3 Read Concept Map Request Message

1145 This message represents an HTTP GET from the Terminology Consumer to the Terminology Repository and provides a mechanism for retrieving a single ConceptMap with a known resource id.

3.100.4.3.1 Trigger Events

1150 When the Terminology Consumer possesses an `id` of a ConceptMap (either through query, database lookup, or other mechanism) for which it requires additional or new information, it issues a Read Concept Map Request.

3.100.4.3.2 Message Semantics

A Terminology Consumer initiates a read interaction using HTTP GET as defined at <http://hl7.org/fhir/R4/http.html#read> on the ConceptMap Resource. The target is formatted as:

GET [base]/ConceptMap/[resourceId]

1155 Where [base] is the URL of Terminology Repository.

The `resourceId` included in the request always represents the unique id for the ConceptMap within the scope of the URL. For example, while `http://example1.org/ihe/ConceptMap/1` and `http://example2.com/ihe/ConceptMap/1` both contain the same [resourceId], they reference two different resource instances.

1160 Note: The use of "http" or "https" in URL does not override requirements to use TLS for security purposes.

1165 A Terminology Repository shall support responding to a request for both the JSON and the XML messaging formats as defined in FHIR. A Terminology Consumer shall accept either the JSON or the XML messaging formats as defined in FHIR. See ITI TF-2x: Appendix Z.6 for more details.

See ITI TF-2x: Appendix W for informative implementation material for this transaction.

3.100.4.3.3 Expected Actions

1170 The Terminology Repository shall process the request to retrieve the ConceptMap that matches the given resource id, and return a response as defined at <http://hl7.org/fhir/R4/http.html#read> or an error code as defined at <http://hl7.org/fhir/http.html#Status-Codes>.

3.100.4.4 Read Concept Map Response Message

The Terminology Repository's response to a successful Read Concept Map message shall be an **HTTP 200** (OK) Status code with a ConceptMap Resource, or an appropriate error status code, optionally with an OperationOutcome Resource.

1175 3.100.4.4.1 Trigger Events

The Terminology Repository found a ConceptMap Resource matching the resource identifier specified by the Terminology Consumer.

3.100.4.4.2 Message Semantics

1180 The Read Concept Map Response is sent from the Terminology Repository to the Terminology Consumer as a single ConceptMap, as defined at <http://hl7.org/fhir/R4/conceptmap.html>

The "content-type" of the response will depend upon the requested response format indicated by the Terminology Consumer.

See ITI TF-2x: Appendix Z.6 for more details on response format handling. See ITI TF-2x: Appendix Z.7 for handling guidance for Access Denied.

1185 If the Terminology Repository is unable to produce a response in the requested format, it shall respond with an **HTTP 4xx** error indicating that it was unable to fulfill the request. The Terminology Repository may be capable of servicing requests for response formats not listed, but shall, at minimum, be capable of producing XML and JSON encodings.

3.100.4.4.3 Expected Actions

1190 The Terminology Consumer has received the response and continues with its workflow.

3.100.5 Security Considerations

See the general Security Consideration in ITI TF-1: 51.5.

Add Section 3.101

1195 3.101 Translate Code [ITI-101]

This section corresponds to transaction [ITI-101] of the IHE IT Infrastructure Technical Framework. Transaction [ITI-101] is used by the Terminology Consumer and Terminology Repository Actors.

3.101.1 Scope

1200 This transaction is used by the Terminology Consumer that supports the Translate Option to translate a given code from a ValueSet to a code from another ValueSet based on a ConceptMap Resource. The request is received by the Terminology Repository that supports the Translate Option. The Terminology Repository processes the request and returns a response of Parameters with the translated code.

1205 3.101.2 Actor Roles

Table 3.101.2-1: Actor Roles

Actor:	Terminology Consumer
Role:	Requests a translation of a code from one ValueSet to another based on a ConceptMap from the Terminology Repository.
Actor:	Terminology Repository
Role:	Returns information for the translated code based on criteria provided by the Terminology Consumer.

3.101.3 Referenced Standards

HL7 FHIR	HL7 FHIR standard R4 http://hl7.org/fhir/R4/index.html
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1210 3.101.4 Messages

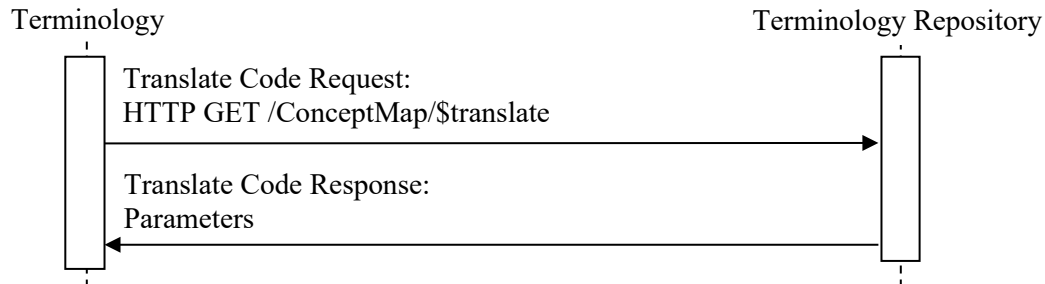


Figure 3.101.4-1: Interaction Diagram

3.101.4.1 Translate Code Request Message

1215 The Translate Code Request message is a FHIR `$translate` operation on the ConceptMap Resource.

3.101.4.1.1 Trigger Events

A Terminology Consumer triggers a Translate Code Request to a Terminology Repository according to the business rules for the translation. These business rules are outside the scope of this transaction.

1220 3.101.4.1.2 Message Semantics

A Terminology Consumer initiates an `$translate` request using HTTP GET as defined at <http://hl7.org/fhir/conceptmap-operation-translate.html> on the ConceptMap Resource. The required input parameters are identified in Table 3.101.4.1.2-1.

The URL for this operation is: `[base]/ConceptMap/$translate?[parameter=value]`

1225 Where `[base]` is the URL of Terminology Repository.

See ITI TF-2x: Appendix W for informative implementation material for this transaction.

Table 3.101.4.1.2-1: Translate Code Message HTTP Input Parameters

Input Parameter Name	IHE Constraint	Search Type	Description
url [0..1]	[1..1]	uri	A canonical URL for a concept map. The server must know the concept map (e.g., it is defined explicitly in the server's concept maps, or it is defined implicitly by some code system known to the server.

Input Parameter Name	IHE Constraint	Search Type	Description
source [0..1]	[1..1]	uri	Identifies the value set used when the concept (system/code pair) was chosen. May be a logical id, or an absolute or relative location. The source value set is an optional parameter because in some cases, the client cannot know what the source value set is. However, without a source value set, the server may be unable to safely identify an applicable concept map, and would return an error. For this reason, a source value set SHOULD always be provided. Note that servers may be able to identify an appropriate concept map without a source value set if there is a full mapping for the entire code system in the concept map, or by manual intervention.
code [0..1]	[1..1]	code	The code that is to be translated. If a code is provided, a system must be provided.
system [0..1]	[1..1]	uri	The system for the code that is to be translated.
target [0..1]	[1..1]	uri	Identifies the value set in which a translation is sought. May be a logical id, or an absolute or relative location. If there is no target specified, the server should return all known translations, along with their source.
_format [0..1]		mime-type	The requested format of the response from the mime-type value set. See ITI TF-2x: Appendix Z.6.
conceptMap [0..1]	[0..0] This parameter is not allowed when the url parameter is used.	Concept Map	
conceptMapVersion [0..1]		string	The identifier that is used to identify a specific version of the concept map to be used for the translation. This is an arbitrary value managed by the concept map author and is not expected to be globally unique. For example, it might be a timestamp (e.g., yyyyymmdd) if a managed version is not available.
version [0..1]		string	The version of the system, if one was provided in the source data.
coding [0..1]	[0..0] This parameter is not allowed when the code+system parameters are used.	Coding	

Input Parameter Name	IHE Constraint	Search Type	Description
codeableConcept [0..1]	[0..0] This parameter is not allowed when the code+system parameters are used.	Codeable Concept	
targetsystem [0..1]	[0..0] This parameter is not allowed when the target parameter is used.	uri	
dependency [0..*]			Another element that may help produce the correct mapping.
dependency.element [0..1]		uri	The element for this dependency.
dependency.concept [0..1]		Codeable Concept	The value for this dependency.
reverse [0..1]		boolean	if this is true, then the operation should return all the codes that might be mapped to this code. This parameter reverses the meaning of the source and target parameters.

3.101.4.1.3 Expected Actions

- 1230 The Terminology Repository shall process the input parameters to discover the value sets and code to be translated that matches the parameters given and return a response as per Section 3.101.4.2 or an OperationOutcome with an error message.

3.101.4.2 Translate Code Response Message

3.101.4.2.1 Trigger Events

- 1235 The Terminology Repository found the translation details matching the input parameters specified by the Terminology Consumer as a result of a Translate Code Request.

3.101.4.2.2 Message Semantics

See ITI TF-2x: Appendix Z.6 for more details on response format handling. See ITI TF-2x: Appendix Z.7 for handling guidance for Access Denied.

- 1240 The response message is a FHIR Parameters Resource with properties of the code set based on the out parameters defined at <http://hl7.org/fhir/conceptmap-operation-translate.html> and reproduced in Table 3.101.4.2.2-1.

Table 3.101.4.2.2-1: Translate Code Message HTTP Output Parameters

Parameter Name	Type	Description
result [1..1]	boolean	True if the concept could be translated successfully. The value can only be true if at least one returned match has an equivalence which is not unmatched or disjoint.
message [0..1]	string	Error details, for display to a human. If this is provided when result = true, the message carries hints and warnings (e.g., a note that the matches could be improved by providing additional detail).
match [0..*]		A concept in the target value set with an equivalence. Note that there may be multiple matches of equal or differing equivalence, and the matches may include equivalence values that mean that there is no match.
match.equivalence [0..1]	code	A code indicating the equivalence of the translation, using values from http://hl7.org/fhir/valueset-concept-map-equivalence.html
match.concept [0..1]	Coding	The translation outcome. Note that this would never have userSelected = true, since the process of translations implies that the user is not selecting the code (and only the client could know differently)
match.product [0..*]		Another element that is the product of this mapping
match.product.element [0..1]	uri	The element for this product
match.product.concept [0..1]	Coding	The value for this product
match.source [0..1]	uri	The canonical reference to the concept map from which this mapping comes from

1245 **3.101.4.2.3 Expected Actions**

The Terminology Consumer has received the response and continues with its workflow.

3.101.5 Security Considerations

See the general Security Consideration in ITI TF-1: 51.5.